Vorticity State Estimation For Aeroelastic Control, Phase I

Completed Technology Project (2012 - 2013)

Project Introduction

Flight control, structural reliability, and efficiency depend critically on the ability to assess the time-accurate unsteady aerodynamic loads and moments for each lifting surface under nominal and adverse flow conditions. Tao Systems and California Institute of Technology propose to develop a flow control system that utilizes advanced sensors and a vorticity state estimator (VSE) to reach flow states unattainable without continuous control feedback. The flow control scheme enables manipulation of the vorticity state to achieve performance objectives, such as short take-off/landing through controlled aerodynamic lift at angles of attack near stall.

Primary U.S. Work Locations and Key Partners

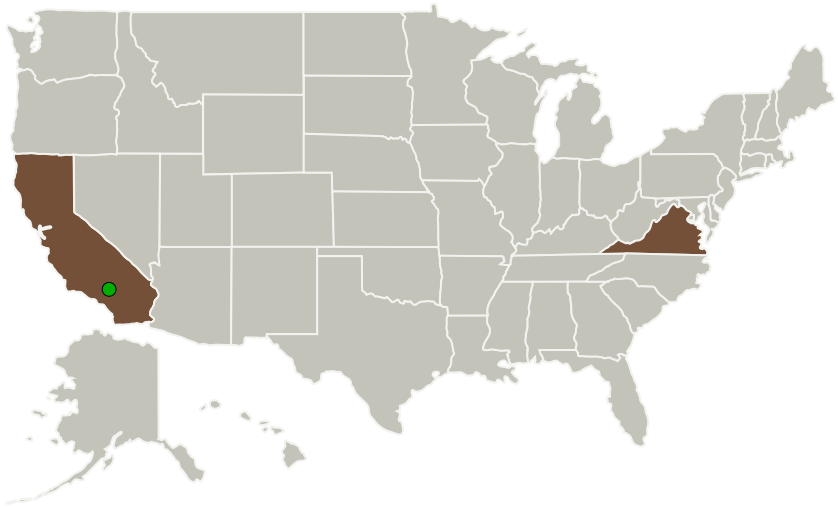

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Table of Contents

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Organizations Performing Work	Role	Type	Location
Tao of Systems Integration, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Hampton, Virginia
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
California Institute of Technology(CalTech)	Supporting Organization	Academia	Pasadena, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

February 2012: Project Start

February 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138566)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tao of Systems Integration, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Arun Mangalam

Co-Investigator:

Arun Mangalam

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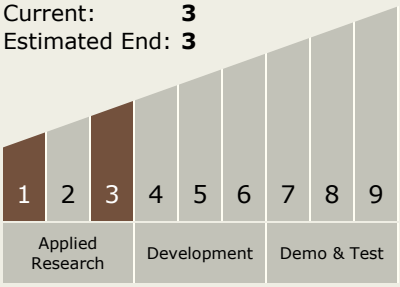
Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.1 Aerodynamics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System